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Agent	LEE, Keon Joo
Inventor	Chung-Ryeol Cheon
Applicant	SAMSUNG ELECTRONICS CO., LTD.
Title of Invention	METHOD FOR DUPLICATING CM IN PRIVATE WIRELESS NETWORK
Title of Invention(KPA)	METHOD FOR DUPLICATING CM IN PRIVATE WIRELESS NETWORK

Abstract(KPA)

PURPOSE: A method for duplicating a CM(Call Manager) in a private wireless network is provided to maintain the service continuity of a private wireless network system by embodying CM duplication.

CONSTITUTION: An active CM monitor(200) sends an ACM(Active Check Message) to a standby CM monitor(250)(S211). If a response about the ACM is not received during a setup time after sending the ACM, the active CM monitor(200) sends the ACM to the standby CM monitor(250) again(213). The active CM monitor(200) judges that it is a real active CM monitor, and operates a script file (ippcx_run_script file) for operating an active CM(215). The active CM monitor(200) is in an active state(217). If a uniform time elapses after operating the ippcx_run_script file, the standby CM monitor(250) sends an ACM to the active CM monitor(200)(219). The active CM monitor(200) corresponds to the ACM, and sends an SCM(Standby Call Manager) message to the standby CM monitor(250) for informing that the standby CM monitor(250) is a real standby CM monitor(221). The active CM monitor(200) and the standby CM monitor(250) continuously monitor the state of the object, and are normally operated before fault is generated(223).

Abstract

The present invention relates to the method for dualizing the call manager in the private radio network system, and after starting driving according to the initialization of the active call manager and transmitting the active call manager inspection message with the opponent call manager monitor, if the response message is not received for the setup time, the active call manager is actually recognized as the active call manager. If failure happens while operating to the active state after the script file for runing the active call manager being executed and runing the stand by call manager monitor, the call manager is switched to the stand by call manager monitor.

Representative drawing
Fig. 2

Keyword(s)
The active call manager, standby call manager, active call manager monitor, stand by call manager monitor, change over, duplexing

Description

■ Brief explanation of the drawing

Figure 1 is a schematical diagram of the internal configuration of the normal private radio network system

Figure 2 is a signal flow graph showing the call manager duplexing initialization according to a preferred embodiment of the present invention

Figure 3 is a signal flow graph showing the process of notifying change over fact to the standby call manager in the active call manager according to another preferred embodiment of the present invention in the change over to the private branch exchange

Figure 4 is a signal flow graph showing data file copy process in the standby call manager the change over in the active call manager shown in another preferred embodiment of the present invention

■ Background Art

The present invention relates to the private radio network system, particularly, to the method for implementing the call manager duplexing and maintaining the service continuity of the private radio network system.

Figure 1 is a schematical diagram of the internal configuration of the normal private radio network system.

Referring to Figure 1, the private wireless network is comprised of the private base station controller (pBSC: private Base Station Controller) (115), the private mobile switching center (pMSC: private Mobile Switching Center) (117), and the private home location register (pHLR: private Home Location Register) (119). And and it is wirelessly connected to the mobile station (MS: Mobile Station) (111) and base station (BTS: Base Transceiver Subsystem), which are subscriber that is, the first base station (BTS 1) (113), and the second base station (BTS2) (112) with the base stations like the third base station (BTS3) (114) and the public switching telecommunication network (PSTN: Public Switching Telecommunication Network) and the function of connecting with the public land mobile network (PLMN: Public Land Mobile Network) are performed.

And it is the private base station controller (115), of the private wireless network and private mobile switching center (117) and private home location register (119) the only in which it has difference in the point that the general base station controller of the public land mobile network (PLMN: Public Land Mobile Network), the mobile switching center , and the home location register and operation function are identical and it only supports the service about the subscribers within the private wireless network. That is, the private base station controller (115) performs the radio link and wire link control, and hand-off functions. It comprises the radio channel with the mobile station (111) and the first base station (113), the second base station (112) , and the third base station (114) manage the radio resource. The private home location register (119) performs the subscriber location register function. And the subscriber ID and with the numbering plan related information, with the subscriber operation related information, with the certification-related information, information related to additional service, the billing-related information etc are stored.

And the call manager (CM: Call Manager) (121) is connected to the private base station controller (115) and private mobile switching center (117). The call manager loader is operated and different operating programs of the private mobile switching center (117) and private base station controller (115) that is software are used and it controls. And the call manager (121) is connected through the IPM (123) to the private branch exchange (PBX: Private Branch eXchange) (125). The number of private branch exchange which the IPM (123) is connected to the private wireless network, that is, the private branch exchange node number performs connection between a plurality of private branch exchange nodes in case of being implemented as the some extent thing. In fig. 1, the case in which the node of the private branch exchange (125) is 1 is shown.

But the call manager (121) operated abnormally due to the error occurrence etc. because of the call manager (121) being used, or it was impossible that the operation sent was employed if it was impossible to the operation sent including the power off etc., or unexpected the operation sent had the problem that it was impossible to normally maintain the call process service in the private wireless network. And due to this, problem called the service poor quality was generated.

■ Technical Task

Therefore, the object of the present invention relates to the method for implementing the call manager duplexing in the private radio network system.

It arc another object of the present invention to provide the switching method for the active call manager and the call service that is continuous between the standby call manager in the private radio network system.

It is another object of the present invention to provide the method for providing the communications path according to the change over generation to the private radio network system in the call manager duplexing to the private branch exchange.

If the response message about the process, of starting driving according to the initialization of the active call manager and transmitting the active call manager inspection message with the opponent call manager monitor and active call manager inspection message is not received in the active call manager in which each operates the call manager monitor and the private wireless network equipped with the standby call manager as to the method for duplicating call manager from the opponent call manager monitor for the setup time, the present invention for achieving above-described purposes actually recognizes the active call manager as one of the call manager. It is done by feature to if blocking is sensed to the process, of operating to the active state after executing the script file for runing the active call manager and runing the instead by call manage monitor and active state among operation, the call manager switching message be transmitted with the stand by call manage monitor and include the process where the standby call manager controls in order to transit from thereafter to the active state.

■ Structure & Operation of the Invention

Hereinafter, while it is explained only the necessary part, the description of the except part has to note to will be omitted in order not to disheval the gist of the present invention referring to the figure to particularly illustrate. In the following illustration, understand operation.

Before the present invention is illustrated. The processes according to a preferred embodiment of the present invention is generated in the private radio network system and the private branch exchange liver illustrated in fig. 1. That is, in fig. 1, as described above, the private wireless network is comprised of the private base station controller (pBSC: private Base Station Controller) (115), the private mobile switching center (pMSC: private Mobile Switching Center) (117), and the private home location register (pHLR: private Home Location Register) (119). And and it is wirelessly connected to the mobile station (MS: Mobile Station) (111) and base station (BTS: Base Transceiver Subsystem), which are subscriber that is, the first base station (BTS 1) (113), and the second base station (BTS2) (112) with the base stations like the third base station (BTS3) (114) and the public switching telecommunication network (PSTN:

Public Switching Telecommunication Network) and the function of connecting with the public land mobile network (PLMN: Public Land Mobile Network) are performed.

But in the call manager (CM: Call Manager) (121), illustrated in fig. 1 although not illustrated, the present invention, it is implemented as the duplexing (duplication) in the different manner as illustrating in fig. 1. That is, is dualized and realized to the active call manager and stand by (standby) call manager. The separate reference numeral be given to the active call manager and standby call manager in the embodiment of the present invention. Moreover, the call manager monitor that is the separate operation state inspection process in order to examine the operation state about the active call manager and standby call manager in the embodiment of the present invention is operated. That is, in the active call manager, the active call manager monitor (200) is used and the operation state is kept a close watch on. While the stand by call manager monitor (250) being used in the standby call manager and keeping a close watch on the operation state, the mutual operation state of course can be monitored between the active call manager monitor (200) and stand by call manager monitor (250) through the reciprocity signal transceive.

In this way, the call manager (121) dualized and realized is connected to the private base station controller (115) and private mobile switching center (117). The call manager loader is operated and different operating programs of the private mobile switching center (117) and private base station controller (115) that is software are used and it controls. And the call manager (121) is connected through the IPM (123) to the private branch exchange (PBX: Private Branch eXchange) (125).

In this way, the active call manager and standby call manager altogether exist and standby call manager operate and the active call manager operates abnormally due to the error occurrence etc. or in case or it is impossible to the mean rate performance including the power off etc., it appoints as the standby call manager with the change over (switch over) and the call manager (121) dualized and realized as described above like that maintain the operation which the active call manager performs.

And then, the replication embodiment of the call manager, that is, the active call manager and operation processes decides to be looked into duplexing is implemented in the form of the standby call manager.

Firstly, referring to Figure 2, the dualized call manager as described above, that is, the initialization of the standby call manager and active call manager decides to be illustrated.

Referring to Figure 2, if the power source is in initial the approval (power on), the respective power source is applied in the active call manager dualized and realized as described above and standby call manager and the initialization operation is thus started. That is, in the active call manager, the active call manager monitor (CM MON(ACT)) (200) runs. The stand by call manager monitor (CM MON (STB)) (250) runs in the standby call manager. Of course, the to operate to the standby call manager active call manager and the thing are set up as the default value and of the active call manager and standby call manager are determined according to situation and the active call manager and the thing operate. Therefore, for the call manager monitor runing in the active call manager, the active call manager monitor (200) is. And for the call manager monitor runing in the standby call manager, the stand by call manager monitor (250) is.

For example, as shown in Figure 2, in the active call manager monitor (200) and the state where the stand by call manager monitor (250) is set up, the active call manager monitor (200) transmits the stand by call manager monitor (250) low-active call manager monitor inspection message (ACM: Active Check Message) with the opponent call manager monitor if the power source is applied (211 step). At this time, the active call manager monitor (200) the stand by call manager monitor (250) actually is unable to transmit the response message about the active call manager monitor inspection message in case of being the active call manager monitor. That is, the ippcx run script file is due to have former in the active call manager and the state that nots if it nots if the standby call manager performs operation in fact and the stand by call manager monitor (250) exists to use the script file, oneself actually judges as the active call manager monitor after the active call manager monitor (200) starts driving and for runing the active call manager that is, the ippcx run script file.

In the meantime, in this way, after transmitting the active call manager monitor inspection message, if the response about the active call manager monitor inspection message is not received for the setup time, the active call manager monitor (200) again transmits the active call manager inspection message (213 step). Here, it is the time to queue the response about the active call manager monitor inspection message in the active call manager monitor (200) to do because of being the setup time. For example, 3 second is queued. And in the embodiment of the present invention, is of course to be possible that the response message about that actually determines the active call manager monitor (200) as the active call manager monitor for example, after the case of transmitting the active call manager monitor inspection message with the several times, that is, the second is done and it illustrates but the first transmits the active call manager monitor inspection message if the response message does not react for the setup time.

In this way, the active call manager monitor (200) that oneself actually judges as the active call manager monitor runs the ippcx run script file which is the script file for runing the active call manager (215 step). In this way, the active call manager monitor (200) queues to the active state after runing the ippcx run script file (217 step). Moreover, after the predetermined time passes as the active call manager monitor (200) runs the ippcx run script file, the stand by call manager monitor (250) runs for example, after 16 second goes by. Here, the predetermined time which passes according to run the ippcx run script file means the time to run the stand by call manager monitor (250) of the standby call manager corresponding to operating programs which the active call manager runs that is the operating programs of the private mobile switching center (117) and private base station controller (115) and active call manager but be required.

Therefore, if the predetermined time passes the ippcx run script file after drive, the stand by call manager monitor (250) accomplishes action and the stand by call manager monitor (250) transmits the active call manager inspection message with the opponent call manager monitor, that is, the active call manager monitor (200) like the time when the active call manager monitor (200) starts to operate (219 step). Because of knowing whether the stand by call manager monitor (250) operates to the stand by whether oneself actually operates in the operation sent beginning to active or not, or not this is to inspect this for the first time.

The active call manager monitor (200) already exists in case the stand by call manager monitor (250) transmits the active call manager inspection message. Therefore the active call manager monitor (200) transmits the standby call manager (SCM: Standby Call

Manager) message that is the message which corresponds with the active call manager inspection message and in which the stand by call manager monitor (250) actually informs the stand by call manager monitor with the stand by call manager monitor (250) (221 step). Oneself senses that oneself actually operates to the stand by call manager monitor and the stand by call manager monitor (250) receiving the standby call manager message that the active call manager monitor (200) transmits queues oneself to the standby state

In this way, if oneself senses that the active call manager monitor (200) and stand by call manager monitor (250) accomplish action and oneself operates to the respective active call manager monitor and stand by call manager monitor in fact, before failure occurs while continuously watching the state of opponent, the active call manager monitor (200) and stand by call manager monitor (250) normally operate (223 step).

In the meantime, in fig. 2, while the active call manager monitor (200) and stand by call manager monitor (250) each other continuously watch the state, or in case the active call manager monitor (200) reached the mean rate impossible state including the power off etc. as blocking including the error occurrence etc., as described above, the change over (switch over) is generated in the middle accomplishing action normally between the active call manager monitor (200) and stand by call manager monitor (250). That is, presently, for the active call manager monitor (200) operating, the standby state is. The stand by call manager monitor (250) operating has to consist of the active state with state transition. Only if one does that, the active call manager monitor (200) obstacle-generating as described above is switched with the stand by call manager monitor (250) and it is possible for the normal operation.

And then, the active call manager monitor (200) is switched to the stand by call manager monitor (250) with above statement. Referring to Figure 3, the process of notifying change over fact to the private wire network in case the stand by call manager monitor (250) operates to the active call manager monitor decides to be illustrated.

Figure 3 is a signal flow graph showing the process of notifying change over fact to the standby call manager in the active call manager according to another preferred embodiment of the present invention in the change over to the private branch exchange.

Before illustrating fig. 3, the stand by call manager monitor (250) illustrated in fig. 2 is switched and it transits from the active call manager monitor (200) shown in fig. 3 to the active state. And it operates to for convenience active of description, meaning is put and the same reference numeral decides to be given. Referring to Figure 3, it previously operates to the stand by call manager monitor with current state and it is switched and in order to notify switched fact to the private branch exchange (125), the active call manager monitor (250) operating in the current state to active notifies to the IPM (123) connected to the private branch exchange (125). And then, the IPM (123) delivers fact to the private branch exchange (125) connected to the IPM (123).

Here, in the standby state of the previous, when the private branch exchange (125) requires data of the private home location register (119) in case of the private branch exchange (125) being ignorant of the change over fact and unable to recognizing clearly the call manager monitor operating to active, the reason why the active call manager monitor (200) transmitted to the active state notifies change over fact to the private branch exchange (125) cannot comprise the proper pass (path). That is, due to be impossible to do not know the IP address of the home location register (119) because the private branch exchange (125) do not know the IP address of the new active call manager monitor (250) due to the change over and demand data. And in the new active call manager monitor (200) as described above according to the change over is fig. 2, the location which actually runs this ippcx run script according to drive the operating program because of it news, operating the ippcx run script is changed and as described above, the IP address is thus changed.

As described above, in order to notify of the change over fact, the active call manager monitor (200) transmits the alive message which is the informational message in fact (311 step). And then, according to receive the alive message, In order to show to normally confirm notice, the IPM (123) transmits the alive response message (ACK) which is the notice normality response message with the active call manager monitor (200) in fact (313 step). In this way, the active call manager monitor (200) receiving the alive response message (ACK) again transmits the alive message with the IPM (123) (315 step). Here, in the active call manager monitor (200) retransmits the alive message is the private radic network system, for example, the alive message number of transmission for notifying of the change over fact is set up as 2 time. Once, because the change over fact was normally reported only in case of repetitively succeeding in, the operation it transmits the alive message in case the alive message number of transmission is set up as 3 times and of receiving the alive response message (ACK) about that is determined.

In case of normally unable to confirming the alive message the IPM (123) transmits the alive response message (NACK) which is the notice abnormal response message with the active call manager monitor (200) in fact (317 step). And then, until it transmits the alive message and it receives the alive response message (ACK) with the set number burn, it repeatedly executes from the active call manager monitor (200).

Moreover, presently, in case the active call manager monitor (200) operating to active state switches to the stand by call manager monitor (250) due to blocking etc., only when has been copy data files used in the active call manager monitor (200) thereafter in order to operate to active state with the change over, the stand by call manager monitor (250). Here, the reason for copying data files which the stand by call manager monitor (250) uses in the active call manager monitor (200) is to prevent from the loss breaking out due to the change over in used datas and performing the abnormal operation. And then, referring to Figure 4, the process of copying data files which the stand by call manager monitor (250) uses due to the change over in the active call manager monitor (200) decides to be illustrated.

Figure 4 is a signal flow graph showing data file copy process in the standby call manager the change over in the active call manager shown in another preferred embodiment of the present invention.

Referring to Figure 4, presently, if the change over including the error occurrence etc. of the active call manager monitor (200) operating to the active state does to need, the active call manager monitor (200) transmits the CCM message which is the call manager switching message that requests to switch the call manager to the stand by call manager monitor (250) operating to the standby state (411 step). And then, in order to operate after the change over to the active call manager monitor, it starts the ippcx run script file which in the above case, it illustrates driving and the stand by call manager monitor (250) produces the Dcopy message which is the message which requests to has been copy data files which the stand by call manager monitor (250) oneself uses in the

active call manager monitor (200) (413 step). In this way, if the Dcopy message is generated, in order to inspect whether it is the state copying data file from the active call manager monitor (200), or not the stand by call manager monitor (250) transmits the ping command with the active call manager monitor (200) (415 step). In order to show the copy free one-state that is, data file, the active call manager monitor (200) receiving the ping command twang transmits the response message (ping response message) with the stand by call manager monitor (250) in response to the ping command (417 step). And then, it transmits data file copy command which is data file copy order for copying the used data file from the active call manager monitor (200) with the active call manager monitor (200) and the stand by call manager monitor (250) that twang receives the response message has been copying data files used in the active call manager monitor (200). Here, essential datas which it surely has to copy in data file copy statistical data, the program loading data (PLD: Program Loading Data) and alarm data etc. exist.

In the meantime, in the detailed description of the present invention, it illustrated about the concrete embodiment. But it is of course that it is possible for many transformation in the limit which it does not deviate from the scope of the present invention. Therefore, while being limited to the explained embodiment and not being determined, the scope of the present invention determines with the range of not only the range of the patent claim which will be described later but also this patent claim and the equal things.

■ Effects of the Invention

In the private radio network system, the present invention as described above dualizes the call manager as the active call manager and standby call manager. It runs moreover, the active call manager, the active call manager monitor and the stand by call manager monitor for monitoring the standby call manager and the active call manager has the abnormal operation or the advantage in which the present invention as described above switches to the opponent call manager monitor, the private radio network system is maintained including blocking etc.

And in this way, it is possible to normally maintain the call process service because it controls so that the call manager having the steady- state on a real time basis operate to the active state. It has the advantage that it improves the QoS of the call process service provided to the private radio network system.

Scope of Claims

■ Claim 1:

The method for duplicating call manager in the private wireless network of the method for duplicating call manager in the active call manager in which each operates the call manager monitor and the private wireless network equipped with the standby call manager, wherein it starts driving according to the initialization of the active call manager and the process of transmitting the active call manager inspection message with the opponent call manager monitor, the process it actually recognizes the active call manager as the active call manager if the response message about the active call manager inspection message is not received from the opponent call manager monitor for the setup time; and of operating to the active state after executing the script file for runing the active call manager and runing the stand by call manager monitor, and the process it transmits the call manager switching message with the stand by call manager monitor if it senses blocking to the active state among operation and where the standby call manager controls in order to transit from thereafter to the active state are included.

■ Claim 2:

The method for duplicating call manager in the private wireless network of claim 1, wherein the stand by call manager monitor receiving the call manager switching message more includes the process, of transmitting the ping command with the active call manager monitor in order to inspect data file used in the active call manager whether it is the copy free one-state or not and the process of controlling so that it transmits data file copy command with the active call manager monitor if the response message answering to the ping command is received from the active call manager monitor and it copy data file.

■ Claim 3:

The method for duplicating call manager in the private wireless network of claim 1, wherein the process, of corresponding to the call manager switching message and the standby call manager transiting to the active state and switching to the new active call manager and new active call manager as described above more include the process of transmitting the informational message in fact notify change over fact about the new active call manager as described above to the private branch exchange connected to the private radio network system.

■ Claim 4:

The method for duplicating call manager in the private wireless network of claim 1, wherein the process of controlling so that it actually recognizes the active call manager as the standby call manager if the response message about the active call manager inspection message is received from the opponent call manager monitor within the setup time and the response message operate to the standby call manager is more included.

■ Claim 5:

The method for duplicating call manager in the private wireless network of the method for duplicating call manager in the active call manager in which each operates the call manager monitor and the private wireless network equipped with the standby call manager.

wherein the process, of transmitting the active call manager inspection message with the opponent call manager monitor it starts driving according to the initialization of the active call manager and the process, of queuing to the active state the stand by call manager monitor is run it executes the script file for runing the active call manager it actually recognizes the active call manager as the active call manager the response message about the active call manager inspection message is not received from the opponent call manager monitor for the setup time and the process, of transmitting the standby call manager message with the stand by call manager monitor the active call manager inspection message is received from the stand by call manager monitor it does to the active state to atmosphere and the stand by call manager monitor receiving the standby call manager message actually recognize the standby call manager as the standby call manager and it includes the process of queuing to the standby state.

■ Claim 6:

The method for duplicating call manager in the private wireless network of claim 5, wherein the active call manager monitor it nots if the response message about the active call manager inspection message exists more includes the process of retransmitting the active call manager inspection message to the opponent call manager monitor.

■ Claim 7:

The method for duplicating call manager in the private wireless network of the method for duplicating call manager in the active call manager in which each operates the call manager monitor and the private wireless network equipped with the standby call manager monitor, wherein the active call manager and the process where the active call manager transmits the call manager switching message with the stand by call manager monitor it senses blocking the standby call manager operates to the respective active and standby state and the stand by call manager monitor receiving the call manager switching message include the process of transmitting the ping command for inspecting whether it is possible to copy data file used in the active call manager or not with the active call manager monitor, the process where the active call manager monitor receiving the ping command twang transmits the response message with the stand by call manager monitor in response to the ping command, and the process where the stand by call manager monitor that twang receives the response message controls so that the stand by call manager monitor transmits data file copy order with the active call manager monitor and it copy data file.

■ Claim 8:

The method for duplicating call manager in the private wireless network of claim 7, wherein data file includes at least, statistical data, program loading data, and alarm data.

■ Claim 9:

The method for duplicating call manager in the private wireless network of the method for duplicating call manager in the active call manager in which each operates the call manager monitor and the private wireless network equipped with the standby call manager, wherein the active call manager and the process of determining since the process are made while the standby call manager operates to the respective active and standby state are included.

■ Claim 10:

The method for duplicating call manager in the private wireless network of claim 9, wherein after transmitting the informational message, if the notice abnormal response message is received, the process of transmitting the informational message with the private branch exchange is again more included after the process, of determining since notice is abnormally made and abnormal determination in fact.
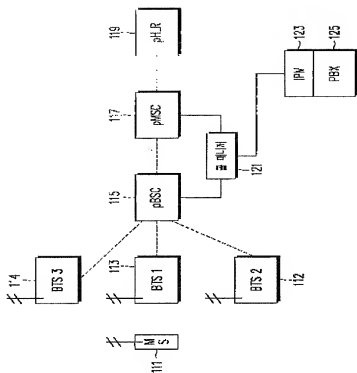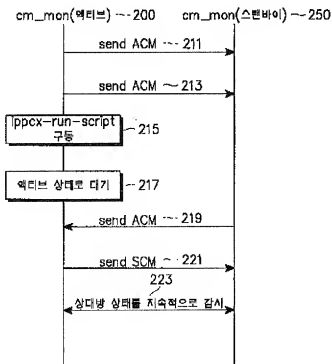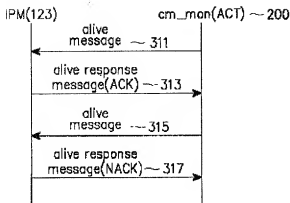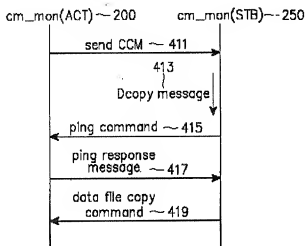
Drawing

■ Fig. 1

Fig. 2

Fig. 3

IPM(123)　　　　　　cm_mon(ACT) ～ 200

alive message ～ 311

alive response message(ACK) ～ 313

alive message ～ 315

alive response message(NACK) ～ 317

■ Fig. 4

cm_mon(ACT) ～ 200　　　cm_mon(STB) ～ 250

send CCM ～ 411

413 ⌇ Dcopy message

ping command ～ 415

ping response message ～ 417

data file copy command ～ 419

Legal Status

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